

CBMS622

Microbiology and Molecular Biology

S2 Day 2019

Dept of Molecular Sciences

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Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

Unit convenor and teaching staff

Unit convenor

Anwar Sunna

anwar.sunna@mq.edu.au

6WW207 (E8C207)

Monday to Friday - by appointment

Practical coordinator

Angela Sun

angela.sun@mq.edu.au

14ER301 (E8A301)

Wednesday and Thursday - by appointment

Credit points

4

Prerequisites

Admission to MLabQAMgt or MRadiopharmSc or MSc or MBiotech or MBioBus or MScInnovation

Corequisites

Co-badged status

Unit description

Microbiology is the study of microorganisms and underpins many other areas of contemporary sciences such as medicine and biotechnology. This unit introduces the role of microorganisms in natural environments and disease and the ways they have been employed for practical benefits across the life sciences and industry. This unit will also provide students with insights into the molecular processes of the living cell, and help students understand the central concepts of molecular biology. Lectures will introduce students to the world of microbes, covering their cell structure and function, genetics and biodiversity, growth, and relevance to medicine, environmental and industrial processes. The hands-on laboratory sessions provide the students with essential skills and techniques used in general and molecular microbiology and demonstrate principles taught in the lectures. This unit will be excellent for students majoring in biomolecular sciences, biology, environmental sciences and medical sciences.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.

Apply appropriate laboratory skills and techniques to be able to work confidently and safely in a molecular or general microbiology laboratory setting.

Design and conduct independent scientific research in the area of molecular and general microbiology.

Search for and use recognised sources of scientific information to extend knowledge within the discipline.

Record molecular biology and microbiological experimental data, interpret and communicate this appropriately.

Assessment Tasks

Name	Weighting	Hurdle	Due
Pre-lab assessments	10%	No	Ongoing
Practical Skills	5%	No	Ongoing
*Participation	0%	No	Ongoing
Mid-Semester Examination	20%	No	13/9/19
Scientific Report	20%	No	10/11/19
Final Examination	45%	No	University Examination Period

Pre-lab assessments

Due: **Ongoing** Weighting: **10%**

Continuous Pre-lab assessments will be conducted throughout the semester on iLearn. The assessment will cover the practical materials of the week. You will have a set amount of time (30 min) to complete this online task. This activity will be available from the start of the semester (so you will have plenty of time to work on it), and deadline for submission is 1 hour prior to your lab session. You are encouraged to work on the pre-lab questions in the lab manual first before attempting the online assessment to avoid going over the time limit (30 min) This is a single attempt activity (no multiple attempts). If you miss the practical session but submitted the assessment on time, no mark will be given to the assessment unless your special consideration is approved. This will contribute to 10% of your overall course mark.

On successful completion you will be able to:

- Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.
- Apply appropriate laboratory skills and techniques to be able to work confidently and safely in a molecular or general microbiology laboratory setting.
- Design and conduct independent scientific research in the area of molecular and general microbiology.
- Search for and use recognised sources of scientific information to extend knowledge within the discipline.
- Record molecular biology and microbiological experimental data, interpret and communicate this appropriately.

Practical Skills

Due: **Ongoing** Weighting: **5%**

You will be tested for two practical skills essential for Microbiology. You will have enough time to learn and practice these techniques during the laboratory sessions before being tested. This will contribute to 5% of your overall course mark.

On successful completion you will be able to:

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- Design and conduct independent scientific research in the area of molecular and general microbiology.

*Participation

Due: **Ongoing** Weighting: **0**%

Live Streaming is **NOT** available for this unit, you will need to **attend** the lectures to participate in this activity. You will be given a number of multiple choice questions relevant to the current lecture that will need to be completed during the lecture session. This activity utilises the Kahoot! platform (https://kahoot.it/) and requires mobile device and internet access to participate. A paper form will be available upon request. See instructions on the iLearn unit for additional details on the installation and participation in this activity. You will be given an opportunity to practice during the unit introductory lecture. The activity will be conducted during the lectures, it is advised that the students endeavour to participate in all lecture sessions for the best possible outcome. ***This**

activity provide you with a 5% bonus mark (depending on how well you perform in the Kahoot!) in addition to the 100% overall course mark.

On successful completion you will be able to:

 Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.

Mid-Semester Examination

Due: **13/9/19** Weighting: **20%**

A multiple choice mid-semester test will be held during class time on 13/9/2019(1-2pm). The test will cover material (lectures and practicals) from Week 1 to 6 only (lecture 1-12). You will need to take a calculator into the examination. Only non-programmable calculators may be taken into the examination. This will contribute to 20% of your overall course mark.

On successful completion you will be able to:

- Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.
- Design and conduct independent scientific research in the area of molecular and general microbiology.

Scientific Report

Due: **10/11/19** Weighting: **20%**

This exercise is an introduction to conducting and managing an independent research project. Students will work in pairs. This assignment is designed to allow you to develop and achieve the learning outcomes, graduate attributes and capabilities outlined in this unit guide. Thus groups/pairs are empowered to own their research work and therefore are responsible and accountable for the design, performance and achievements resulting from the research.

This research task will be an ongoing exercise to be performed between weeks 3 and 12, over which the group is to work together on the investigation, discussion and reflection of results. In week 11, each lab group will make a prediction of the identity of the selected unknown organism and the rationale behind their decision, and present their prediction in front of the class. Each presentation (Power Point) should take no longer than 3 minutes. After each presentation, the audience will be given an opportunity to ask questions or make suggestions to the presenters.

An **independently** written 4-page scientific report, based on your research findings, is to be submitted by each student on 10 Nov no later than 11:59 pm.

A rubric outlining what is expected regarding final report structure and a style guide will be

provided in the Laboratory manual, which will be available on iLearn. The assignment should be uploaded onto iLearn as a pdf file – this is to avoid formatting discrepancies that may occur from using different word processors. This assignment will contribute to 20% of your overall course mark. *Penalties will apply for work over the page limit and late submission.*

On successful completion you will be able to:

- Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.
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- Design and conduct independent scientific research in the area of molecular and general microbiology.
- Search for and use recognised sources of scientific information to extend knowledge within the discipline.
- Record molecular biology and microbiological experimental data, interpret and communicate this appropriately.

Final Examination

Due: University Examination Period

Weighting: 45%

The final exam will require students to apply terminology and concepts learnt in the lecture and practical components to answer a variety of questions of a critical thinking nature. The exam will consist of multiple-choice questions, short and long answer questions. You will need to take a calculator into the examination. Only non-programmable calculators may be taken into the examination (3 hours plus 10 minutes reading time).

On successful completion you will be able to:

- Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.
- Design and conduct independent scientific research in the area of molecular and general microbiology.

Delivery and Resources

Classes

Lectures will be held on:

Monday	2-3 pm in 17 Wally's Walk - T1 Theatre
Friday	1-2 pm in 17 Wally's Walk - T1 Theatre

Lectures begin on the 29 July 2019. Lectures graphics will be available in iLearn on the day before each lecture.

CBMS622 Microbiology and Molecular Biology Web Site: http://ilearn.mq.edu.au/

Laboratory classes

Wednesday	1-5 pm	14 Eastern Rd - 130 Science Lab
Wednesday	1-5 pm	14 Eastern Rd - 150 Science Lab
Thursday	9-1pm	14 Eastern Rd - 130 Science Lab
Thursday	9-1 pm	14 Eastern Rd - 150 Science Lab
Thursday	2-6 pm	14 Eastern Rd - 130 Science Lab
Thursday	2-6 pm	14 Eastern Rd - 150 Science Lab

Students will need to register for one of the classes only.

Practicals start on the second week of the semester (first lab on session on 7^{tht} and 8th August 2019). **Bring a lab coat and A4 notebook (60+ pages) to your first lab session.**

Please note that practical classes are a compulsory component for this course with medical certificates being required should a student be absent due to illness. These should be submitted online as Special Consideration application using the application form in As kMQ. More information and how to apply for Special Consideration cab be found at: https://stude.nts.mq.edu.au/study/my-study-program/special-consideration.

Required and Recommended Texts and/or Materials

Prescribed text:

Brock Biology of Microorganisms, Global Edition 15th edition, 2018. Madigan, Bender, Buckley, Sattley and Stahl. Publisher: Pearson Australia. ISBN: 9781292235103

CBMS622 Microbiology and Molecular Biology Practical Manual - The full laboratory manual will be available on iLearn for download, you must bring a copy with you to your laboratory class and are expected to have read through all of the planned activities. Please note you must also bring a lab coat, closed shoes and A4 lab notebook (60+ pages) to each practical, beginning in Week 2. Important, you won't be allowed in the laboratory without a lab coat!

Technology Used and Required

You are expected to access the unit web site on a frequent basis and download PDF files provided. Please note information may also be sent by email to your student email account so please look at your email account on a frequent basis.

Unit Web Page

The URL of the CBMS622 Microbiology and Molecular Biology iLearn site is: http://ilearn.mq.ed u.au/

You will be asked for a username and password. Your username is your student MQ Id. Your MQ Id and password have been mailed to you by the University. If you have lost them go to the student portal: http://my.mg.edu.au.

You are expected to access the unit web site very frequently. This site contains important information including notes on ALL the topics to be covered.

In-class Participation assessment

The in-class *participation assessment* utilises the Kahoot! platform (https://kahoot.it/) and requires mobile device and internet access to participate.

Teaching and Learning Strategy

CBMS622 is a 3-credit point, half year unit and will require an average of 9 hours of work per week (contact hours plus self study time).

The unit expectation is that you will:

- Read the recommended material and prepare for the laboratory classes.
- · Actively engage in the practical component of the course.
- Complete the assignment, report, practical and assessments, mid-term exam and final exam.

If you prepare and attend all components of the unit and work consistently and continuously throughout the semester, you should be able to develop a strong understanding of the subject, develop key microbiology and molecular biology practical skills and perform satisfactorily in this unit.

Laboratory classes are designed to develop basic laboratory skills, general safety practices and critical and analytical thought – this will be very useful if you continue with molecular biology and microbiology, but are also fundamental to many other areas of science. In-lab and post-lab work are designed to allow you to appropriately record your experimental observations in a detailed and accurate manner and assess your understanding of the theory behind the experiments conducted and to use this understanding to solve related problems.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.m.q.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Appeals Policy

- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- · Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy (Note: The Special Consideration Policy is effective from 4
 December 2017 and replaces the Disruption to Studies Policy.)

Undergraduate students seeking more policy resources can visit the <u>Student Policy Gateway</u> (htt <u>ps://students.mq.edu.au/support/study/student-policy-gateway</u>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

Results

Results published on platform other than <u>eStudent</u>, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in <u>eStudent</u>. For more information visit <u>ask.mq.edu.au</u> or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide

appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/ offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the <u>Acceptable Use of IT Resources Policy</u>. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.
- Apply appropriate laboratory skills and techniques to be able to work confidently and safely in a molecular or general microbiology laboratory setting.
- Design and conduct independent scientific research in the area of molecular and general microbiology.
- Search for and use recognised sources of scientific information to extend knowledge within the discipline.
- Record molecular biology and microbiological experimental data, interpret and communicate this appropriately.

Assessment tasks

- · Pre-lab assessments
- Practical Skills
- *Participation
- Mid-Semester Examination
- Scientific Report
- Final Examination

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.
- Apply appropriate laboratory skills and techniques to be able to work confidently and safely in a molecular or general microbiology laboratory setting.
- Design and conduct independent scientific research in the area of molecular and general microbiology.
- Search for and use recognised sources of scientific information to extend knowledge within the discipline.
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Assessment tasks

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- Practical Skills
- *Participation
- · Mid-Semester Examination
- Scientific Report
- Final Examination

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Assessment tasks

· Pre-lab assessments

- Practical Skills
- *Participation
- Scientific Report
- Final Examination

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.
- Apply appropriate laboratory skills and techniques to be able to work confidently and safely in a molecular or general microbiology laboratory setting.
- Design and conduct independent scientific research in the area of molecular and general microbiology.

Assessment tasks

- · Pre-lab assessments
- · Practical Skills
- *Participation
- · Mid-Semester Examination
- · Scientific Report
- · Final Examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.
- Apply appropriate laboratory skills and techniques to be able to work confidently and safely in a molecular or general microbiology laboratory setting.
- Design and conduct independent scientific research in the area of molecular and general microbiology.
- Search for and use recognised sources of scientific information to extend knowledge within the discipline.
- Record molecular biology and microbiological experimental data, interpret and communicate this appropriately.

Assessment tasks

- Pre-lab assessments
- *Participation
- Mid-Semester Examination
- Scientific Report
- Final Examination

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.
- Apply appropriate laboratory skills and techniques to be able to work confidently and safely in a molecular or general microbiology laboratory setting.
- Design and conduct independent scientific research in the area of molecular and general microbiology.
- Search for and use recognised sources of scientific information to extend knowledge within the discipline.
- · Record molecular biology and microbiological experimental data, interpret and

communicate this appropriately.

Assessment tasks

- Pre-lab assessments
- Practical Skills
- *Participation
- Mid-Semester Examination
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- Final Examination

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Apply appropriate laboratory skills and techniques to be able to work confidently and safely in a molecular or general microbiology laboratory setting.
- Design and conduct independent scientific research in the area of molecular and general microbiology.
- Search for and use recognised sources of scientific information to extend knowledge within the discipline.
- Record molecular biology and microbiological experimental data, interpret and communicate this appropriately.

Assessment tasks

- · Pre-lab assessments
- *Participation
- · Mid-Semester Examination
- · Scientific Report
- · Final Examination

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded,

sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- Apply appropriate laboratory skills and techniques to be able to work confidently and safely in a molecular or general microbiology laboratory setting.
- Design and conduct independent scientific research in the area of molecular and general microbiology.

Assessment tasks

- · Pre-lab assessments
- Mid-Semester Examination
- · Scientific Report
- Final Examination

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcomes

- Apply molecular and microbiological concepts to discuss aspects of medical, industrial and environmental microbiology from the level of molecules through to ecosystems.
- Apply appropriate laboratory skills and techniques to be able to work confidently and safely in a molecular or general microbiology laboratory setting.
- Design and conduct independent scientific research in the area of molecular and general microbiology.

Assessment tasks

- · Pre-lab assessments
- Practical Skills
- Mid-Semester Examination
- Scientific Report
- Final Examination

Special consideration requests including nonattendance and extensions

The University is committed to equity and fairness in all aspects of its learning and teaching. In stating this commitment, the University recognises that there may be circumstances where a student is prevented by unavoidable disruption from performing in accordance with their ability. The University has a policy on special consideration requests that may be found at https://students.mg.edu.au/study/my-study-program/special-consideration.

If you experience serious and unavoidable difficulties at exam time or when assessment tasks are due, you can consider applying for Special Consideration.

Five essential factors of Special Consideration

You need to show that your circumstances meet all of the following criteria:

- 1. were serious, unexpected and unavoidable
- 2. were beyond your control
- 3. caused substantial disruption to your academic work
- 4. substantially interfered with your otherwise satisfactory fulfilment of the unit requirements
- 5. lasted at least three consecutive days or a total of 5 days within the teaching period and prevented completion of an assessment task scheduled for a specific date.

Your supporting evidence must include all of the following:

- 1. identify the circumstances
- 2. include dates and/or the length of the circumstances
- 3. explain the severity and impact of the circumstances
- 4. clearly describe how the circumstances have adversely affected your capacity for effective study to which an assessment relates
- 5. include the date(s) on which you were seen by the professional providing the evidence

This policy is instituted to support students who experience serious and unavoidable disruption such that they do not reach their usual demonstrated performance level. If this does occur please submit a Special Consideration application using the application form in AskMQ.

Non-Attendance: Submit online the relevant documentation together with a Special Consideration application using the application form in AskMQ as described above.

Students MUST contact Dr. Angela Sun (angela.sun@mq.edu.au) immediately to make alternative arrangements if a laboratory session or an assessment task has been missed. Contact can be by email or phone. The intensive nature of laboratory sessions and assessments over a period of weeks means that non-attendance can significantly impact on your progress, can impact on your ability to complete the assignments and also impacts on your laboratory partner/group.

Final Exam

If you receive <u>special consideration</u> for the final exam, a supplementary exam will be scheduled during the supplementary examination period. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination. It is the student's responsibility to email the Student Centre to confirm attendance at the supplementary exam.

Extensions and penalties

10% of the mark allocated for the assignment will be deducted per day for any work submitted late.

Only medical certificates and/or other appropriate supporting documents outlining other serious, extenuating circumstances will be considered when submitting an assignment after the due date. All applications for special consideration or extension must be sought *before the due date* unless this is absolutely impossible.

All applications for extensions of deadlines must be submitted to the Dr. Angela Sun (angela.sun@mq.edu.au).